FIG. 1A

179	191	182	134	138	119	108	132	206	124	131	98	115	111	105	129
155	100	103	164	219	193	43	75	84	66	73	230	40	82	198	122
108	162	176	205	78	0	28	29	24	11	0	31	18	37	224	129
153	167	240	41	28	81	194	198	217	194	227	78	39	28	216	108
149	186	255	75	20	248	166	177	182	165	189	231	79	38	248	119
177	236	49	15	47	204	178	110	111	120	166	248	43	53	230	192
183	254	54	15	251	179	108	119	193	175	120	106	203	250	191	156
177	204	46	34	195	164	109	177	239	200	197	95	114	95	138	126
165	238	70	7	209	179	101	208	47	64	41	47	66	51	66	196
170	216	54	14	218	167	117	205	53	16	21	32	1	8	48	236
186	218	47	21	50	199	126	108	215	244	198	239	81	8	255	189
147	165	209	46	22	232	224	116	115	123	124	250	64	18	240	128
159	175	228	82	26	79	40	244	247	199	209	200	82	31	247	114
122	148	165	210	76	5	27	61	74	83	75	6	4	55	254	137
105	101	107	172	241	234	66	16	25	23	20	44	226	209	171	135
176	168	123	138	130	111	195	218	252	244	205	222	121	103	122	138
250	201	244	245	203	131	98	118	94	122	101	131	125	227	206	118

FIG. 1B

GET READY GET READY GE'
EADY GET READY GET REAI
GET READY GET READY GE'
EADY GET READY GET REAI
GET READY GET READY GE'
EADY GET READY GET REAI
GET READY GET READY GE'
EADY GET READY GET REAI
GET READY GET READY GE'
EADY GET READY GET REAI
GET READY GET READY GE'
EADY GET READY GET REAI
CET READY CET READY CE'

20%

GET READY GET READY GE'
EADY GET READY GET REAI
GET READY GET READY GE'
EADY GET READY GET REAI
GET READY GET READY GE'
EADY GET READY GET REAI
GET READY GET READY GE'
EADY GET READY GET REAI
GET READY GET READY GE'
EADY GET READY GET REAI
GET READY GET READY GE'
EADY GET READY GET REAI
CET READY CET READY CE'

40%

60%

80%

FIG. 2

Warping grid

FIG. 3

Mask

FIG. 4
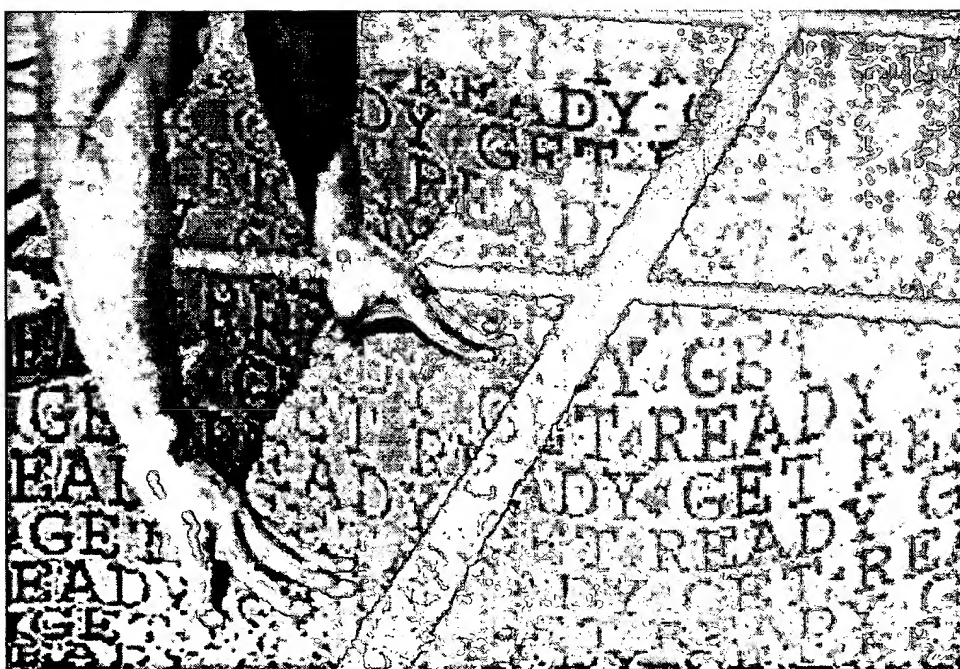
Dithered image

FIG. 5

FIG. 6

$G(x)$

$P(x)$

1

0.5

x

foreground
color

background
color

FIG. 7A

1

d_d d_a d_c d_b

0.5

x

FIG. 7B

d_a d_a+d_b $d_a+d_b+d_c$ $d_a+d_b+d_c+d_d$ $G(x)$

1

0.5

x

C_a C_b C_c C_d C_a C_b C_c C_d C_a C_b C_c C_d

FIG. 7C

FIG 8

FIG. 9A

y'

x'

FIG. 9B

y"

x"
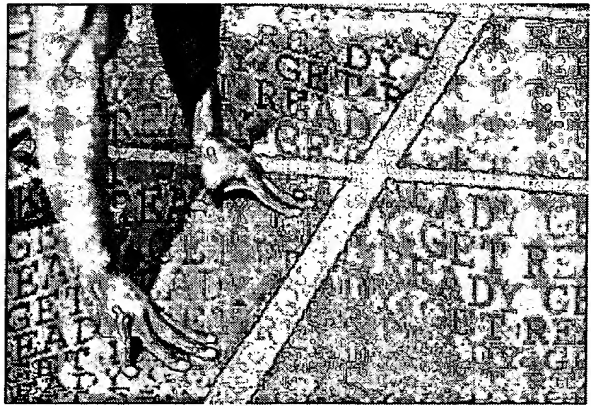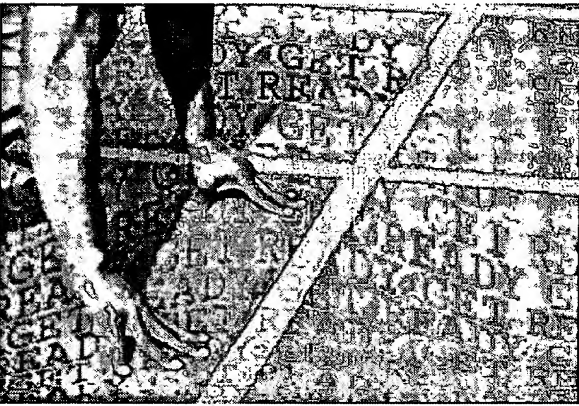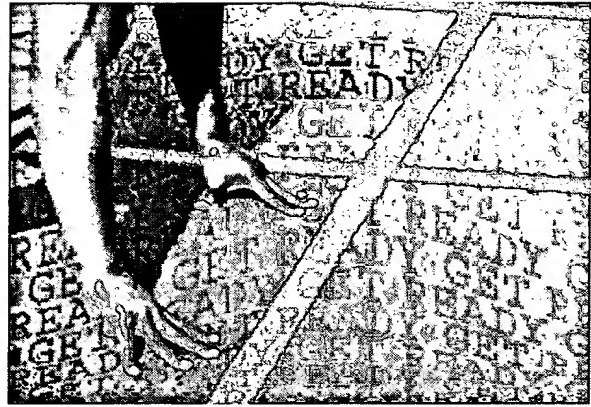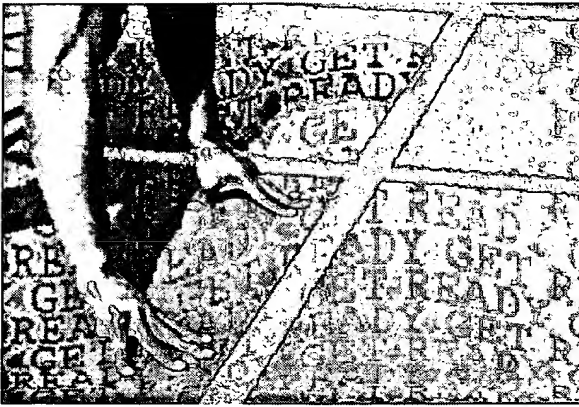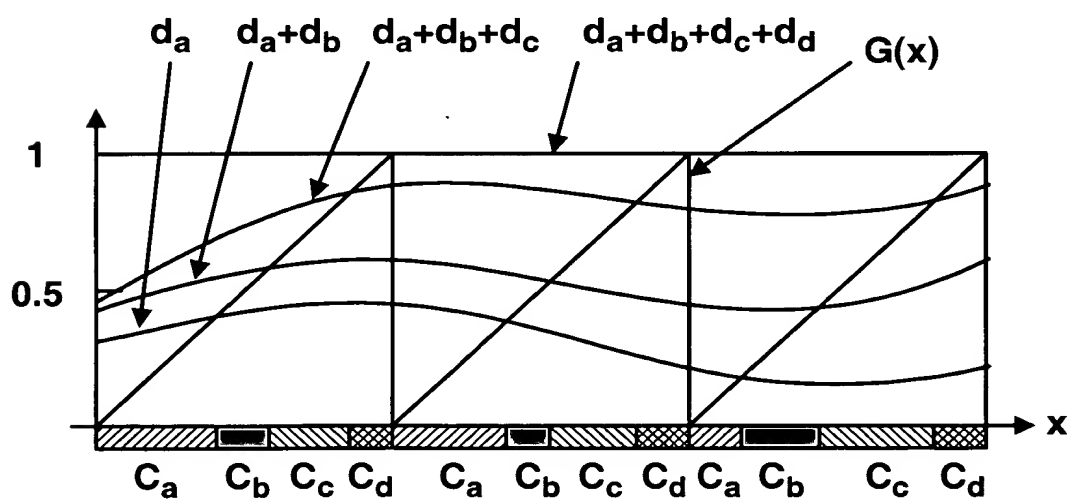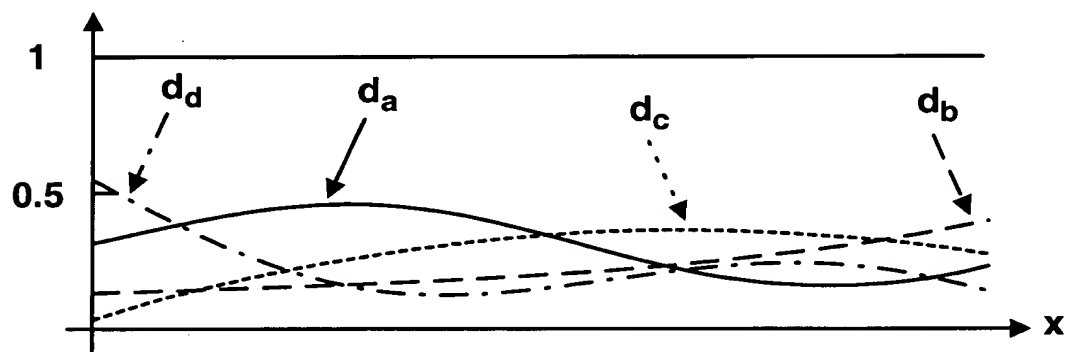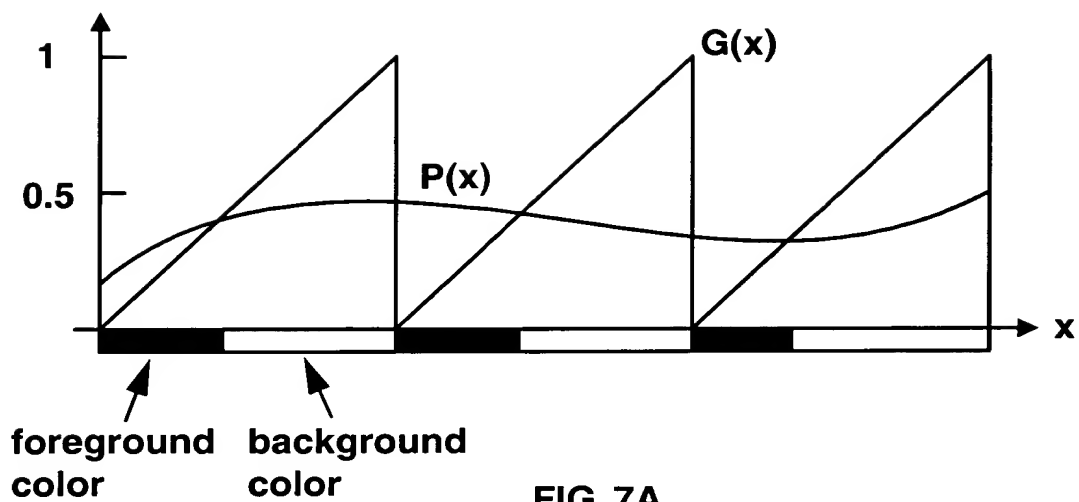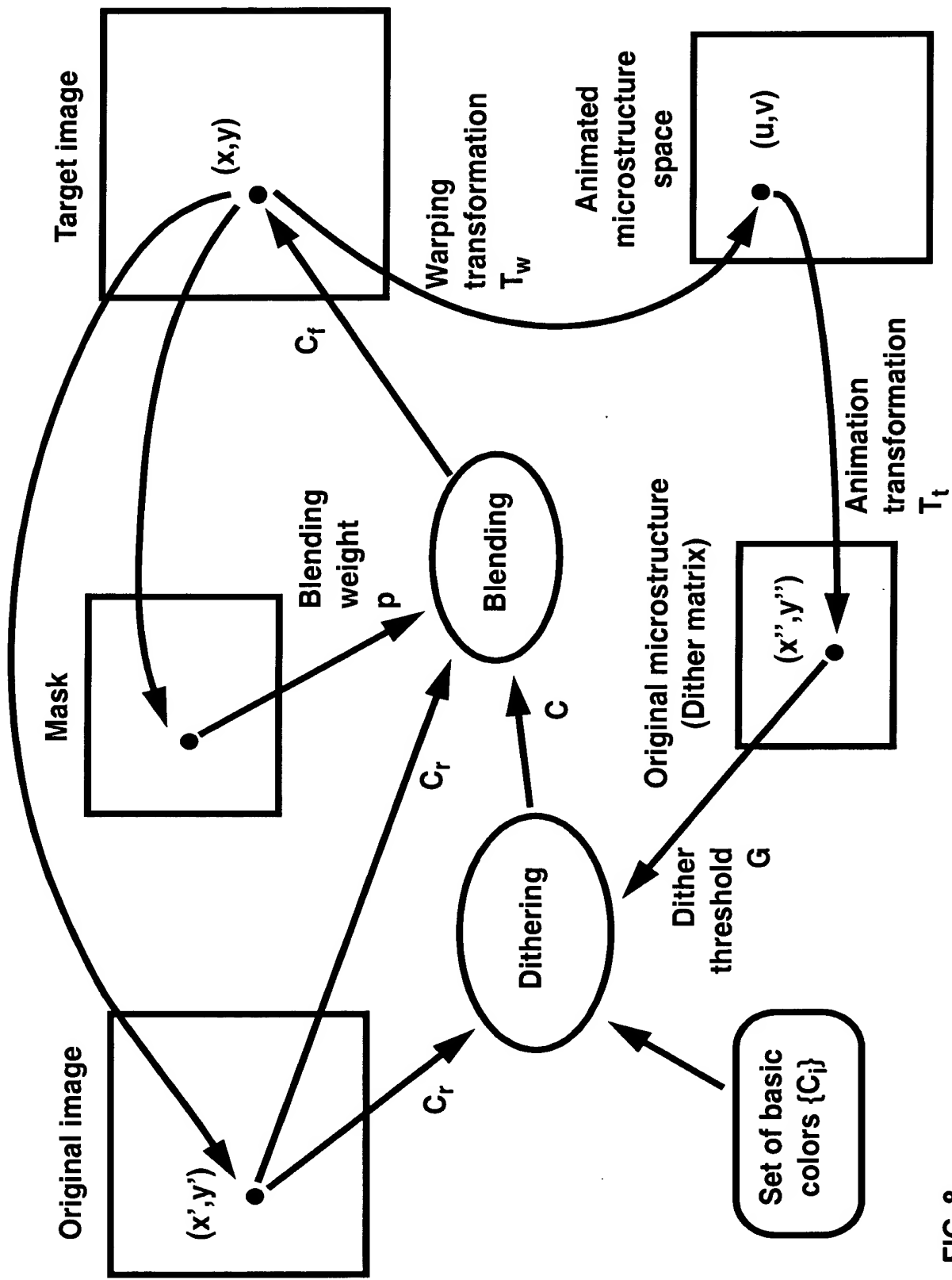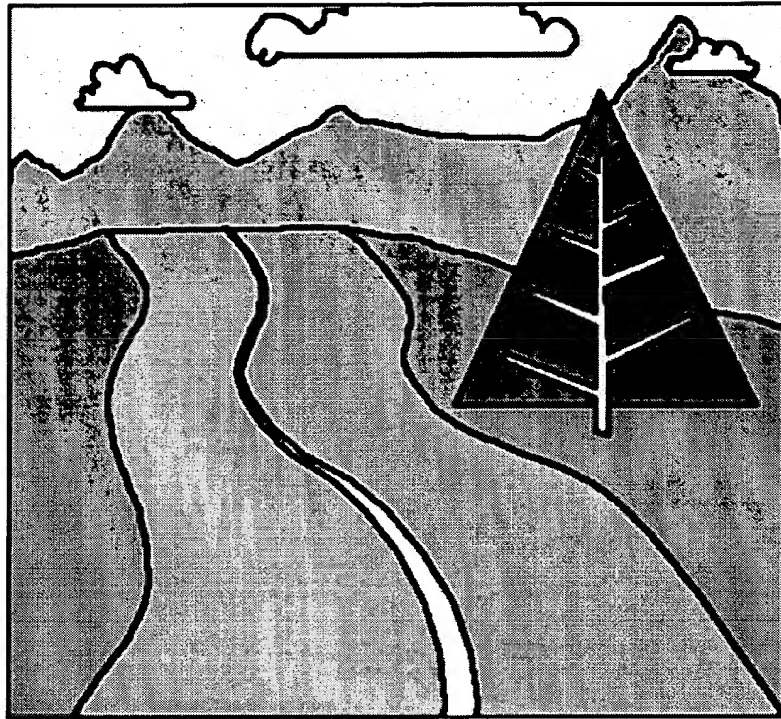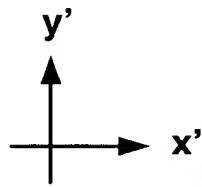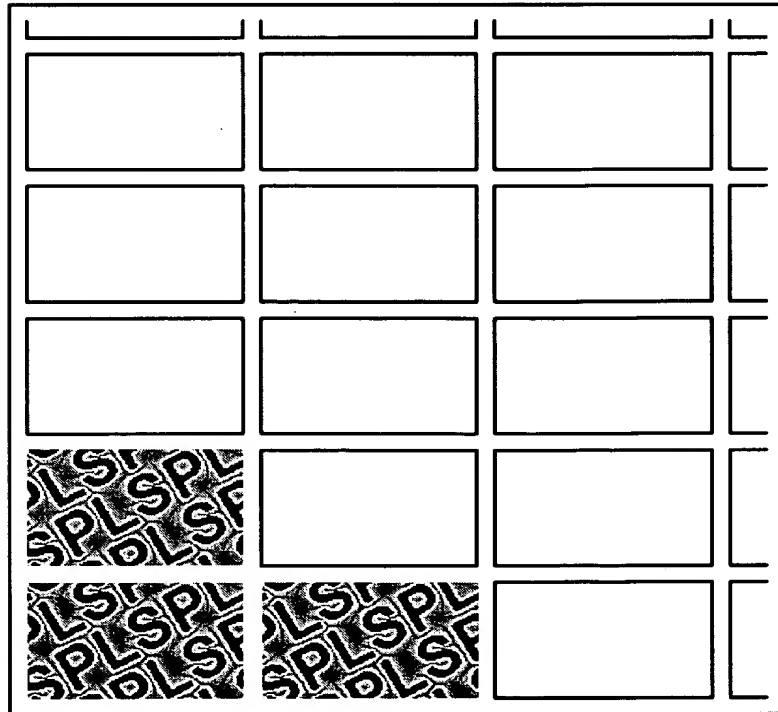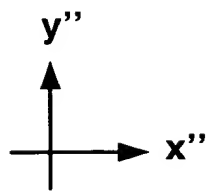
FIG. 10A

FIG. 10B

FIG. 11A

FIG. 11B

Target image
space
(x,y)

$T_w(x,y)$

y

x

Animated
dither matrix
space
(u,v)

v

u

$T_t(u,v)$

Original dither
matrix space
(x'',y'')

y''

x''
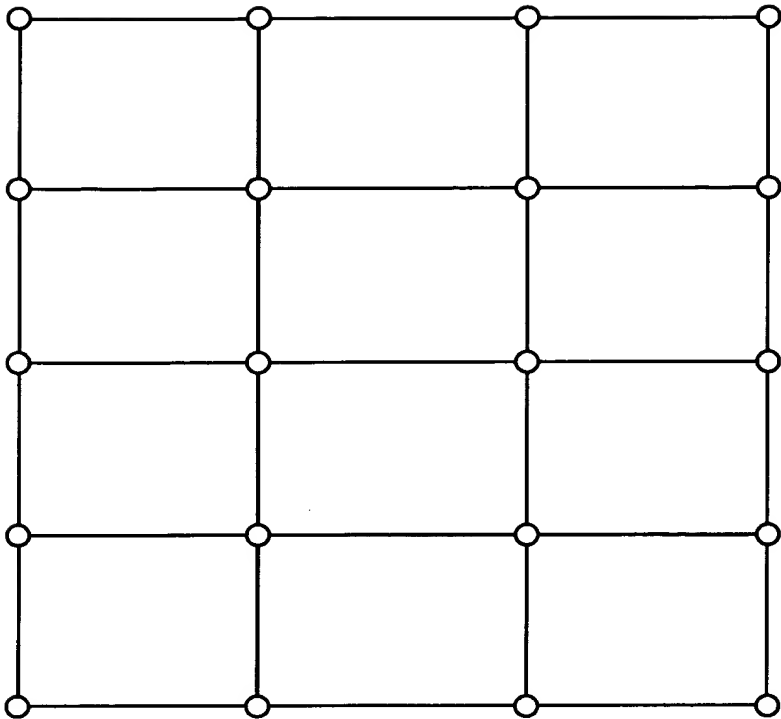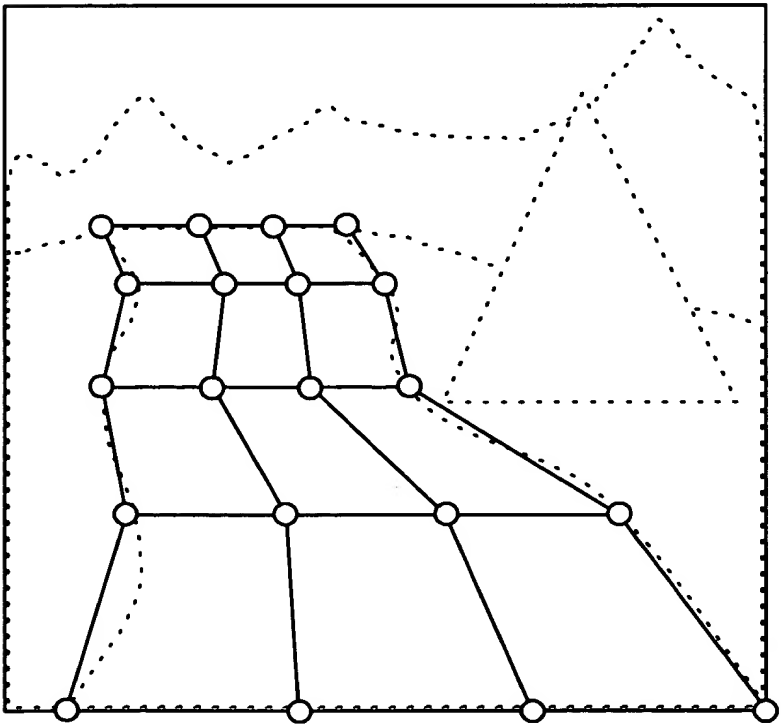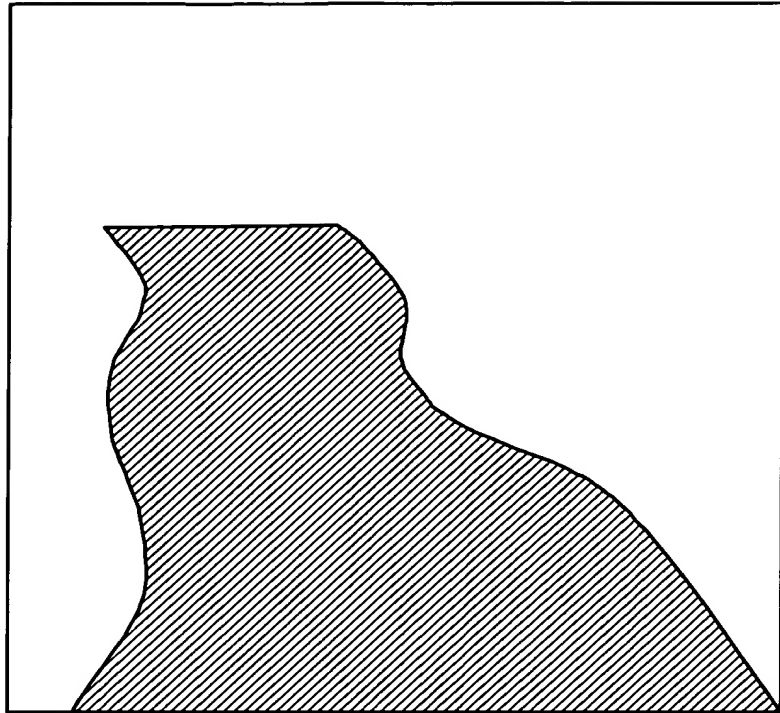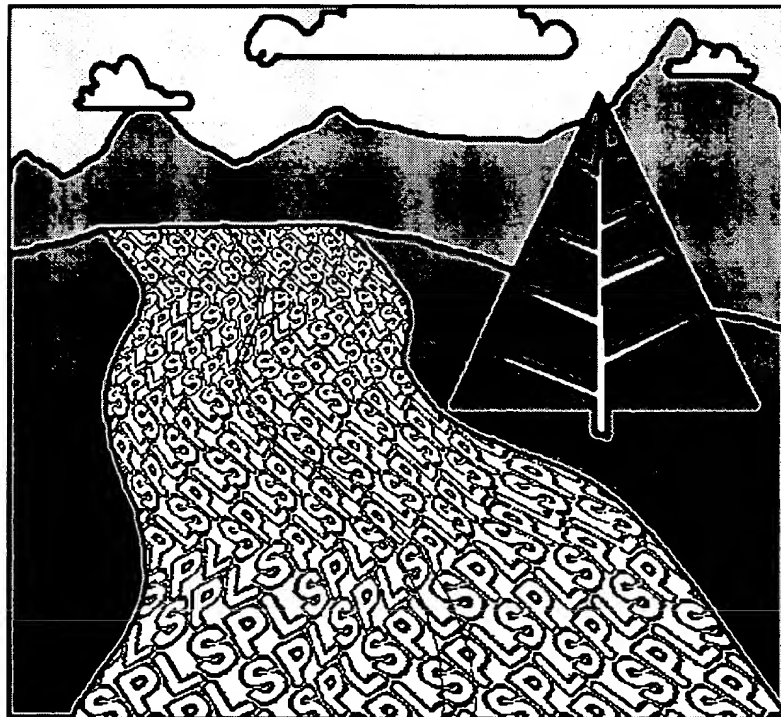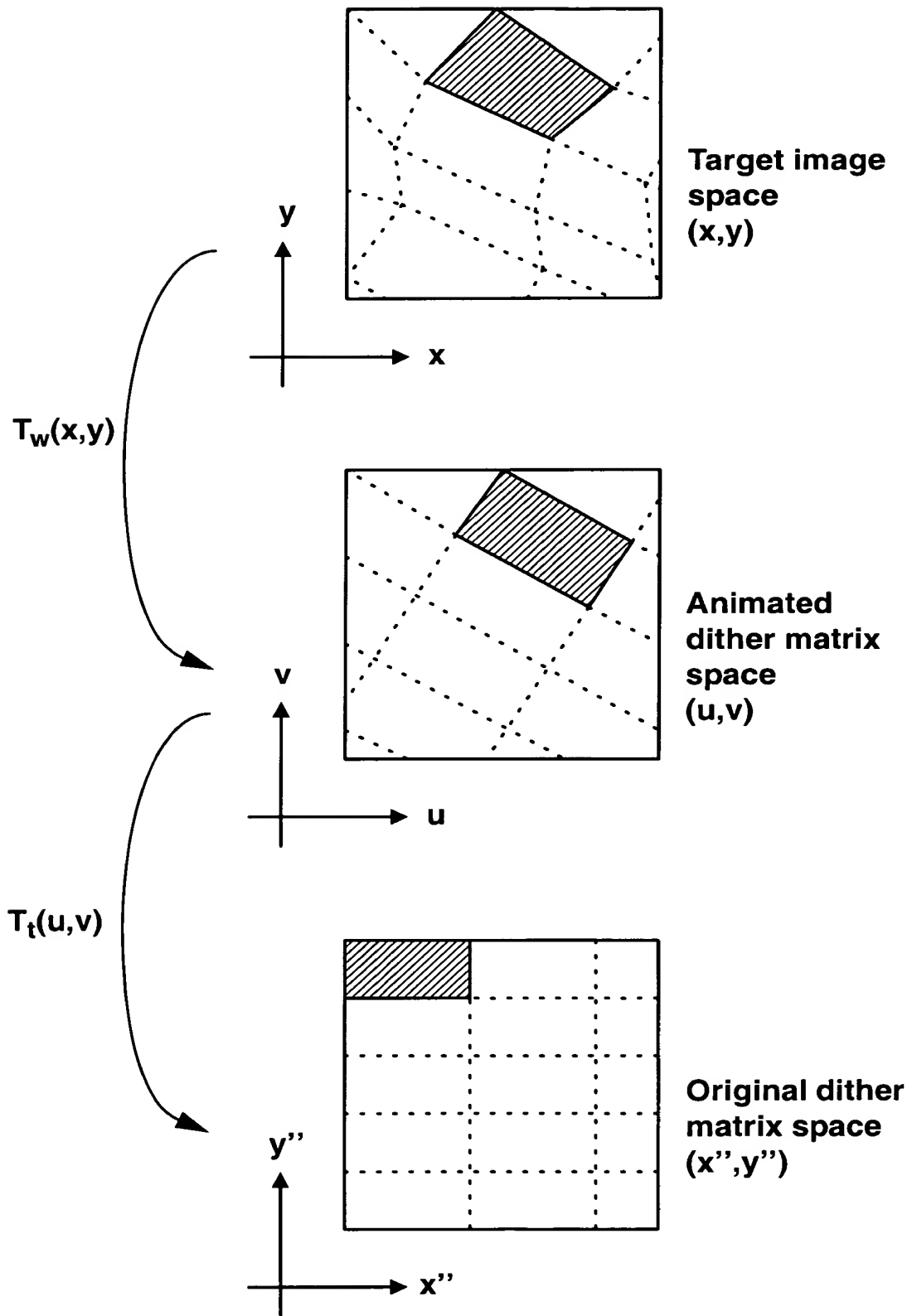
FIG. 12

Original grid
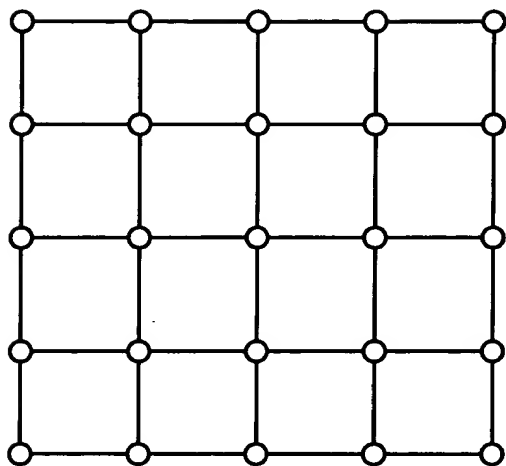
Warped grid
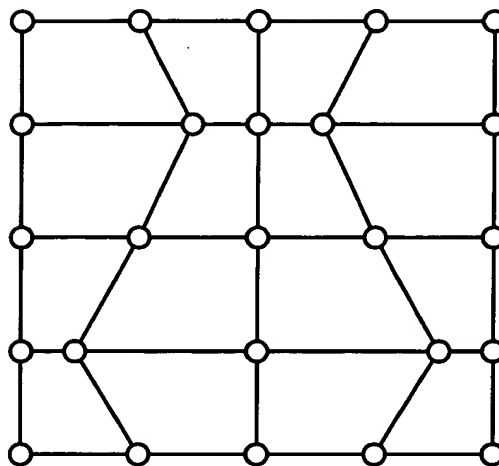
FIG. 13A

Microstructure
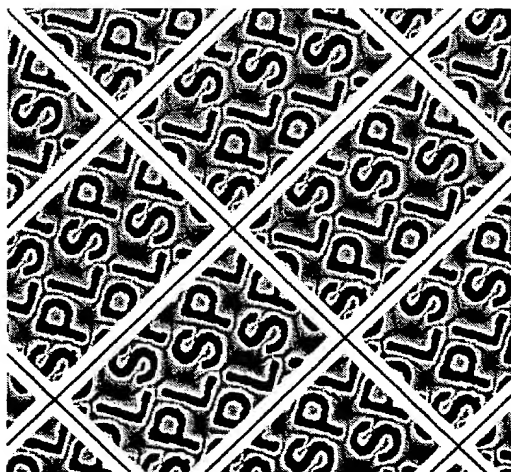
Warped microstructure
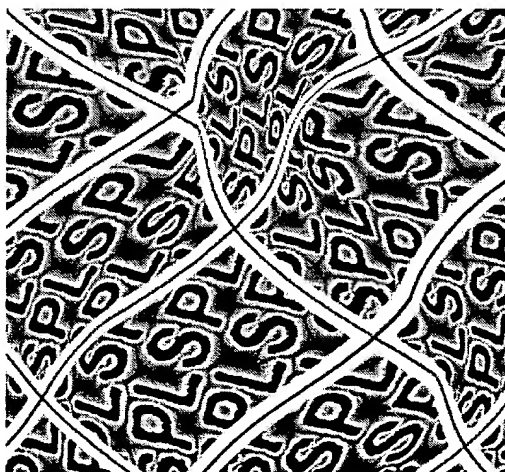
FIG. 13B

FIG. 13C

FIG. 14A

FIG. 14B

FIG. 14C

R: Red   C: Cyan   W: White
G: Green   M: Magenta   K: Black
B: Blue   Y: Yellow
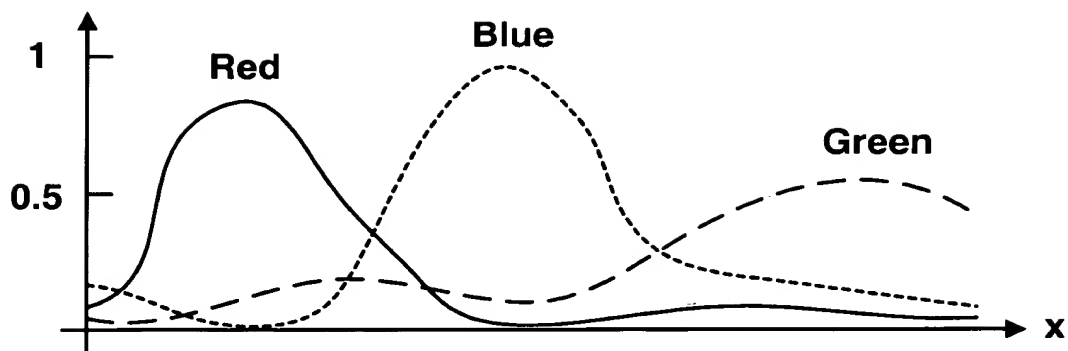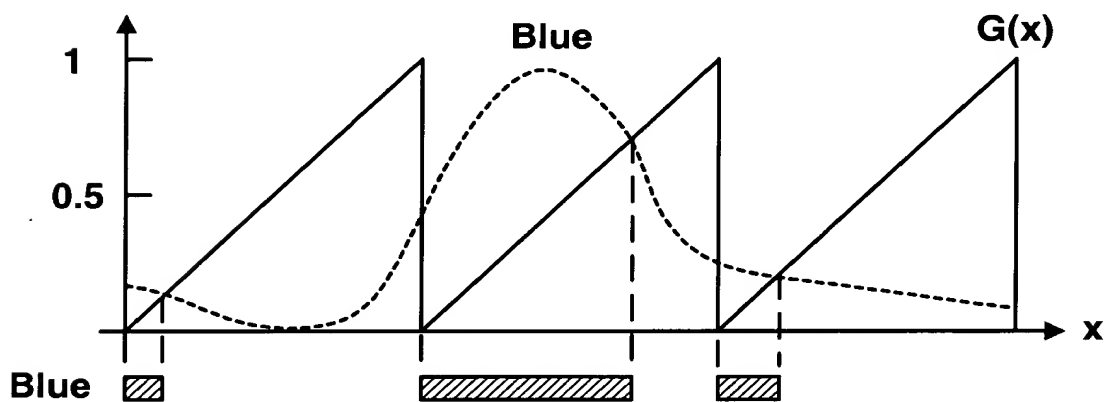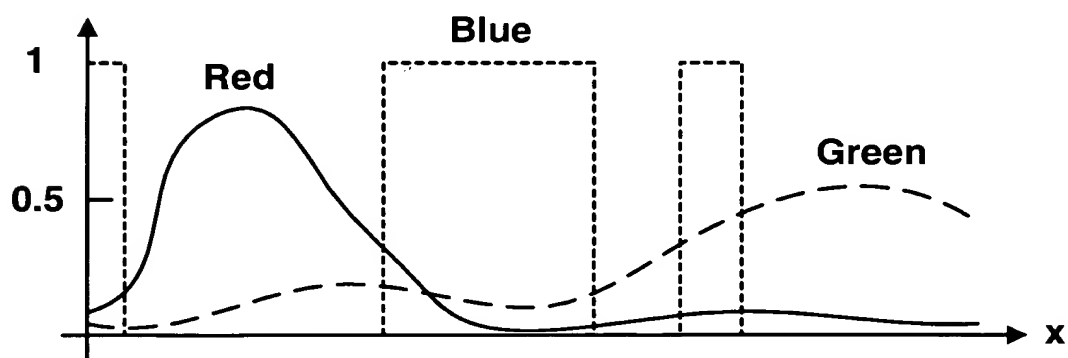
FIG. 15A

FIG. 15B

FIG. 15C

0	8	2	10
12	4	14	6
3	11	1	9
15	7	13	5

FIG. 16A

FIG. 16B

```
Server
computing
system
```
→

```
Client comput-
ing and display
system
```

- input color image
- dither matrix
- animation transformation
- warping transformation
- basic color set $\{C_i\}$
- mask layer

FIG. 17


```
Server
system
```
←
→
```
Designer program
or applet running
on client computer
```

FIG. 18

Designer logs himself on
server synthesizing sys-
tem
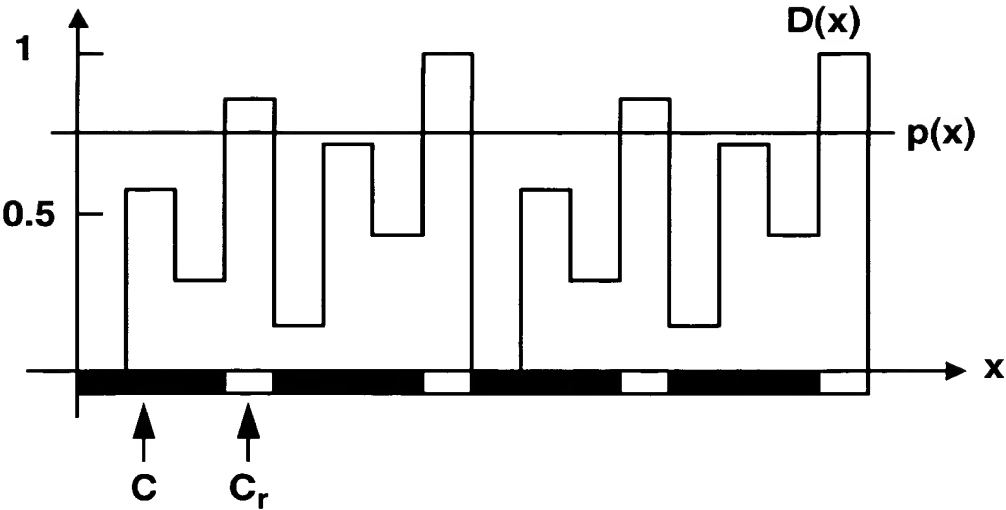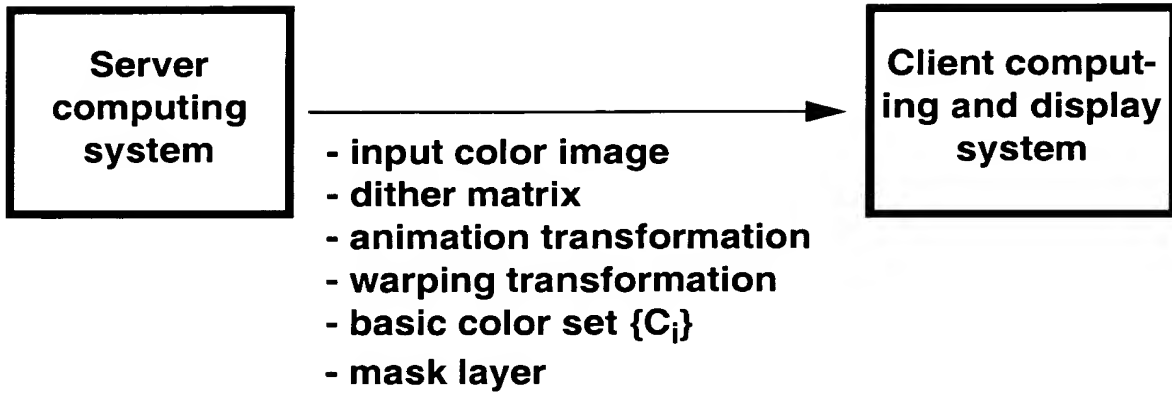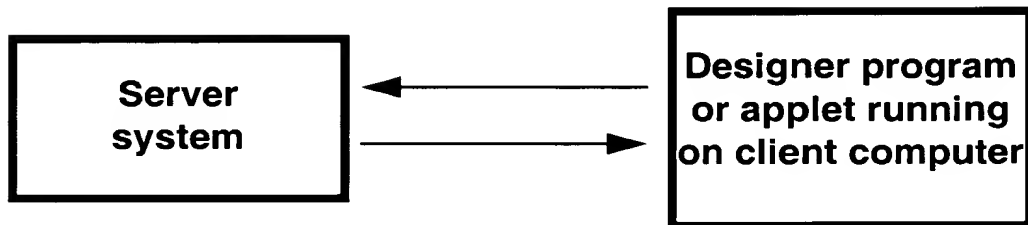
Designer creates the ani-
mated microstructure
image on his computer by
interacting with the server

Designer signs a licensing
agreement and is author-
ized to obtain the designed
data elements and the ani-
mated microstucture ren-
dering software

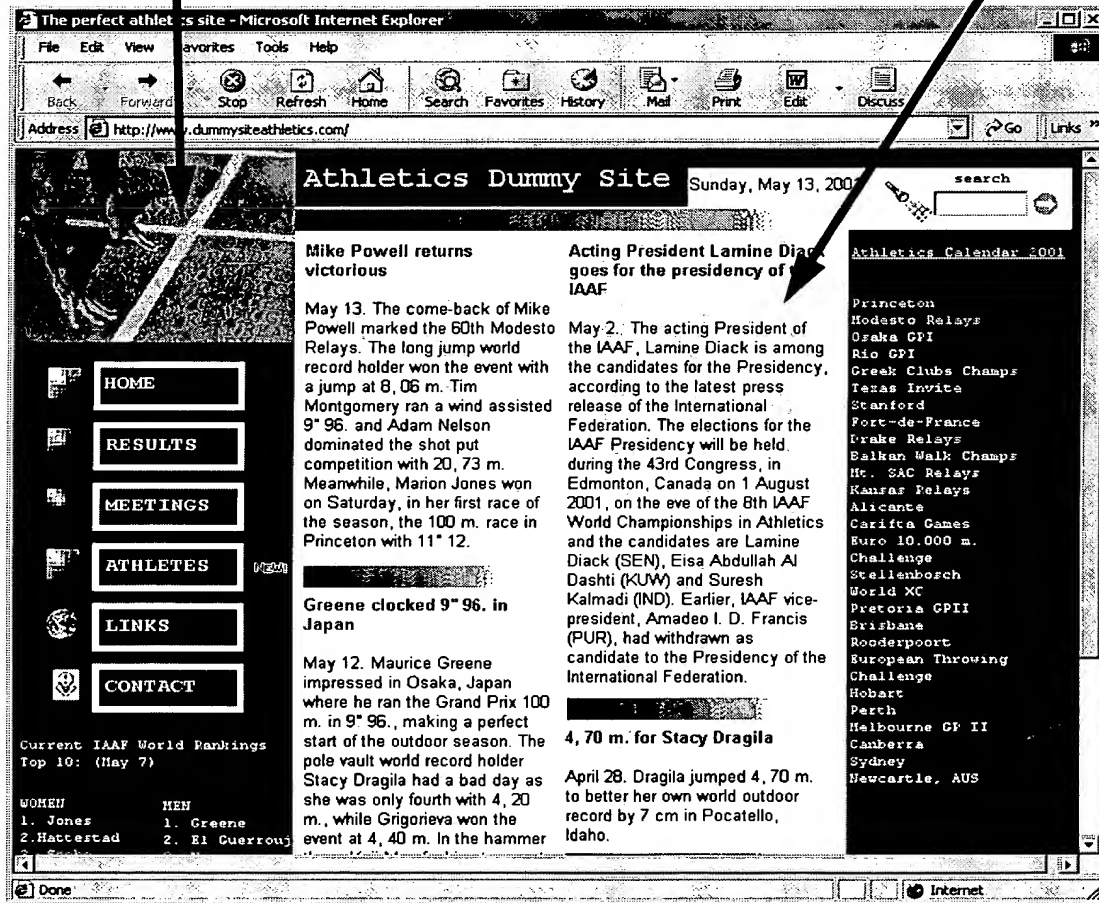FIG. 19

Image with animated microstructure

Web page

FIG. 20